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ABSTRACT

By mid 2001, researchers affiliated with the Library Research Service of the Colorado State Library and the University of Denver had completed four statewide studies on the impact of school library media programs on the achievement of U.S. public school students: Information Empowered: The School Librarian as an Agent of Academic Achievement in Alaska; Measuring UP to Standards: The Impact of School Library Programs and Information Literacy in Pennsylvania Schools; How School Librarians Help Kids Achieve Standards, The Second Colorado Study; and Good Schools Have School Librarians: Oregon School Librarians Collaborate To Improve Academic Achievement. Among the four states, different grades were tested at different levels but, generally, each state tested at elementary, middle, and high school levels. In each state, school library media programs were surveyed at the building level on a variety of topics. The topics common to all four state studies were: staffing levels, staff activities, collection size, usage statistics, and available technology. While the results of the four studies varied somewhat, on the whole the findings concerning what aspects of school library media programs are important were remarkably consistent. Findings for each of the states are highlighted, followed by common findings and distinguishing results of each study. The remainder of the digest discusses controlling for school and community differences, implications and recommended actions by school officials, and other research questions raised by these studies. (AEF)

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By. Keith Curry Lance

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PROOF OF THE POWER:

Recent Research on the Impact of School Library Media Programs on the Academic Achievement of U.S. Public School Students

by Keith Curry Lance

By mid 2001, researchers affiliated with the Library Research Service of the Colorado State Library and the University of Denver had completed four statewide studies on the impact of school library media programs on the academic achievement of U.S. public school students:

- Information Empowered: The School Librarian as an Agent of Academic Achievement in Alaska,
- Measuring Up to Standards: The Impact of School Library Programs and Information Literacy in Pennsylvania Schools,
- How School Librarians Help Kids Achieve Standards, The Second Colorado Study, and
- Good Schools Have School Librarians: Oregon School Librarians Collaborate to Improve Academic Achievement.

Background

Philosophically, these studies are rooted in the Information Power model espoused by the American Association of School Librarians and the findings from six decades of research related to the impact of school library media programs on academic achievement.

Information Power

The latest edition of the American Association of School Librarians' *Information Power: Building Partnerships for Learning* (1998) identifies three roles for school library media specialists (LMS). In a learning and teaching role, the LMS advances the instructional goals of the school. As a provider of information access and delivery, the LMS develops collections and services and facilitates their use. And, as a program administrator, the LMS serves as the library media center (LMC) manager as well as a school-wide advocate and trainer for information literacy.

Previous Research Findings

Over the past half-century, there have been about 75 studies on the impact of school library media programs on academic achievement. Each of the study reports summarized herein contains an exhaustive review of this literature to that date. For that reason, only a thumbnail summary of that review is provided here.

Learning & Teaching

Many early studies of this topic demonstrate the value of the mere presence of a professionally trained and credentialed library media specialist. Such correlations, however, beg the question of what the LMS is doing that makes a difference. In more recent studies, the LMS's contributions as a creator of and a collaborator in a learning community have been the focus. These studies indicate that students perform better academically where the LMS:

- is part of a planning and teaching team with the classroom teacher,
- teaches information literacy, and
- provides one-to-one tutoring for students in need.

Information Access & Delivery

One of the most consistent strands of research on this topic is comprised of studies that demonstrate the value of:

- quality collections of books and other materials selected to support the curriculum,
- state-of-the-art technology that is integrated into the learning/teaching processes, and
- cooperation between school and other types of libraries, especially public libraries.

Program Administration

A key role of the library media specialist, but one that has only been the subject of research for a decade, is program administration. In today's schools, the LMS is not only the manager of the LMC, but also an advocate for information literacy with the principal, at faculty meetings, and in standards and curriculum committee meetings. In addition to being an advocate, the LMS is a trainer who provides in-service programs for teachers on resource-based learning, integrating information literacy into the curriculum, and getting the most out of technology, as well as teaching students.

To be a successful advocate for information literacy, research shows, the LMS must

- have support staff who free him or her from the LMC to participate in important meetings,
- win and keep the support of the principal,
- manage networked technology, and
- raise funds successfully.

Motivations for Further Research

Given the substantial body of research already available on the impact of school libraries, it might be asked why yet another study, let alone multiple studies, needed to be done. There were two major motivations behind these studies: confirming the findings of the original Colorado Study and expanding on that study in several ways.

Time, place and educational politics were the key issues related to confirming the original Colorado findings.

- Do those results hold up over time?
- Are they consistent from one state to another?
- And, perhaps most importantly, do the claimed relationships between library media programs and student performance exist when a state's standards-based tests are substituted for a norm-referenced test (i.e., the Iowa Tests of Basic Skills or ITBS)?

The original Colorado Study identified the importance of the library media specialist playing an instructional role in the school, but it did not define what that meant or what it involved doing. Further, while the study's findings implied the value of principal and teacher support, they did not exactly address those issues, and it failed in an attempt to demonstrate the important relationship of information technology—particularly school networks—to the LM program.

In the four most recent studies, all of these motivations for further research were addressed successfully.

Samples

Among the four states, different grades were tested at different levels but, generally, each state tested at elementary, middle and high school levels. Table 1 identifies the tested grades and number of schools participating in the studies by state.

Table 1. Grades Tested, Number of Participating Public Schools, and Number of Public Schools by State, 1998-99

State (Year Studied)	Grades tested	Number of participating public schools*	Number of public schools
Alaska (1998)	4, 8 & 11	211	461
Pennsylvania (1999)	5, 8 & 11	435	1,691
Colorado (1999)	4 & 7	200	1,178
Oregon (2000)	5, 8 & 10	513	1,215

* Schools including more than one tested grade may be counted more than once

School Library Surveys

In each state, school library media programs were surveyed at the building level on a variety of topics. The topics common to all four state studies were: staffing levels, staff activities, collection size, usage statistics, and available technology.

Respondents for participating libraries were asked to report LM staffing levels, including numbers of individuals and numbers of hours worked per typical week for different types of staff. Ultimately, the distinction between professionally trained and credentialed library media specialists and all other types of staff became the critical one.

To respond to the concern that the original Colorado study did not define what was meant by "an instructional role," the recent surveys asked for a distribution of staff hours per typical week among various activities related to exercising leadership in the school, collaborating with classroom teachers, and creating and maintaining a strong relationship between the LM program and school technology.

Like most surveys of LM programs, these asked for counts of the number of items in the LMC's collection by format (e.g., books, periodicals, audio, video) and usage statistics (e.g., numbers of individual and group visits to the LMC).

To assess the level of integration between the school's LM and technology programs, the surveys also requested counts of computers both in the LMC and elsewhere in the school—provided the computers were networked to library resources. In addition to a general count, numbers of computers capable of particular functions were requested (e.g., providing access to the library catalog, licensed databases, and the World Wide Web).

Available Data

In addition to survey data on school libraries, the studies required substantial amounts of available data: test scores for schools; other school data, including the teacher-pupil ratio, per pupil expenditures, and teacher characteristics, such as the percentage with advanced degrees, average years of experience, and average salary; and community data, including the racial/ethnic distribution of students, the percentage of students eligible for the National School Lunch Program (i.e., poverty), and the percentage of the community's adults who graduated from high school.

The test of academic achievement varied by state. Alaska utilized the California Achievement Tests (CAT), but Pennsylvania, Colorado, and Oregon utilized their own state-designed, standards-based tests. On the basis of an analysis done as part of the original Colorado Study, reading scores were utilized in all four states. The earlier study found that reading scores are extremely highly correlated with other types of test scores—so much so that the other types of scores are statistically redundant.

State departments of education were the sources of most of the remaining data. The only data item they could not provide was the percentage of adult high school graduates in the community. This data was obtained for each school's community from either the U.S. Census American Factfinder or the Federal Financial Institutions Examination Council website.

Results

Successful Types of Library Media Predictors

While the results of the four studies varied somewhat, on the whole the findings concerning what aspects of school library media programs are important were remarkably consistent.

LM Program Development

In all four states, the level of development of the LM program was a predictor of student performance. In all four states, data on staffing levels correlated with test scores. In Pennsylvania, Colorado, and Oregon, additional data on collections and expenditures were predictive of reading scores. Where LM programs are better staffed, better stocked, and better funded, academic achievement tends to be higher.

Staff Activities

Levels of student performance were also related, in all four states, to the extent to which LM staff engaged in particular activities related to the teaching of information literacy and to the exercise of leadership, collaboration, and technology.

LMC Usage

In Alaska, Colorado, and Oregon, individual student visits to the library media center correlated with test scores. Notably, group LMC visits did not demonstrate such a correlation in Alaska or Colorado, but did in Oregon. This last state had mounted a statewide initiative to encourage teacher-librarian cooperation in connection with class visits to LMCs.

Technology

In Alaska, the availability of Internet-capable computers in the LMC was tied to test scores. In Pennsylvania, Colorado, and Oregon, where similar questions were asked about technology, achievement levels increased with the availability of networked computers both in the LMC and elsewhere in the school that provided access to catalogs, licensed databases, and the Internet.

Alaska Findings

In Alaska, the percentage of students scoring proficient or above on reading tests was higher for schools with

- more hours per typical week of professional librarian staffing;
- more staff time spent weekly delivering information literacy instruction to students, planning cooperatively with teachers, and providing in-service training to teachers;
- collection development policies that address the issue of reconsideration requests or challenges to library materials;
- computers with modem capability (to access the Internet); and
- a relationship—formal or informal—with the public library.

In addition to these direct predictors of test scores, the Alaska study identified one series of relationships worthy of note: Schools with more librarian staffing spend more time teaching information literacy, resulting in more student visits to library media centers and, in turn, higher reading scores.

Pennsylvania Findings

In Pennsylvania, higher average reading scores for schools were associated with

- the presence of school librarians with more hours per week of support staff;
- higher expenditures on the library media program;
- larger collections of information resources (e.g., books, periodical subscriptions, Access Pennsylvania and other databases);
- more computers, both in the library media center and throughout the school, that provide access to information resources (e.g., licensed databases, the Internet); and
- spending more library media staff time integrating the teaching of information literacy into the school's curriculum and approach to addressing academic standards.

A cluster of library media staff activities was identified with this integration of information literacy into the school:

- teaching cooperatively with teachers as well as independently,
- providing in-service training to teachers,
- serving on curriculum and standards committees, and
- managing information technology.

Colorado Findings

The latest Colorado study identified four direct library media predictors of academic achievement—and one indirect one. The four direct predictors are LM program development, collaboration activities of LM staff, technology, and flexible scheduling. The indirect predictor is leadership activities of LM staff.

The original Colorado Study identified an LMC Size factor comprised of total weekly LM staff hours per 100 students, volumes per student, and periodical subscriptions per 100 students. The latest study in that state identified a similar, but more elaborate LM Program Development factor comprised of:

- total weekly librarian staff hours per 100 students,
- total LM staff hours per 100 students,
- volumes per student,
- periodical subscriptions per 100 students,
- electronic subscriptions per 100 students, and
- LM expenditures per student.

Where the Pennsylvania study found a single cluster of staff activities related to integrating information literacy into the school, the latest Colorado study found two clusters of staff activities, one associated with leadership and another associated with collaboration.

This leadership factor consisted of typical weekly LM staff hours spent:

- meeting with the principal,
- participating in faculty and curriculum and standards committee meetings, and
- meeting with other LM staff at local and district levels.

Notably, the leadership factor was an indirect rather than a direct predictor of reading scores. Leadership creates an environment for collaboration which, in turn, leads to higher test scores.

The collaboration factor embraced LM staff hours spent:

- planning cooperatively with teachers,
- teaching information literacy,
- providing in-service training to teachers,
- identifying materials for teachers, and
- supporting local networking to link the LMC and classrooms.

As in Pennsylvania, Colorado schools tended to have higher test scores if they had local networks of computers, both in the LMC and in classrooms, that provided access to information resources, particularly licensed databases and the Internet.

At the secondary level only, the Colorado results also provide some preliminary evidence for flexible scheduling. In that state, at that school level, reading scores correlated with individual visits to LMCs, but not group visits. While evidence about the differences between these two types of visits is anecdotal, it indicates that group visits are more often for traditionally assigned library periods, when little or no information literacy instruction may be taking place. By contrast, when students are visiting the LMC individually, they are believed to be more likely to be pursuing somewhat self-directed learning in which they are exercising information literacy skills.

Oregon Findings

The most recent of the four studies conducted by Lance, Rodney and Hamilton-Pennell is for Oregon. It identifies one direct library media predictor of academic achievement, a library media program development factor similar to the one yielded by the latest Colorado study, as well as a host of indirect predictors.

In Oregon, the LM Program Development factor is comprised of:

- total LM staff hours per 100 students,
- print volumes per student,
- periodical subscriptions per 100 students, and
- LM expenditures per student.

The analysis of indirect predictors of student test performance identified an elaborate web of relationships consistent with the findings in Alaska, Pennsylvania, and Colorado. A strong and successful library media program is one:

- That is adequately staffed, stocked and funded. Test scores rise with the size of the LM staff, collection, and budget.
- Whose staff is actively involved leaders in their school's teaching and learning enterprise. As in other states, meeting with the principal, serving on key school committees, and holding LM staff meetings help to create a collaborative environment. Where LM staff spends more time in these activities, students perform better.
- Whose staff provides access to and deliver materials and information that support that enterprise. When LM staff spends more time developing local collections and when LM programs exploit the collections of other libraries via interlibrary loan, test scores improve.
- Whose staff have collegial, collaborative relationships with classroom teachers. The more time library media specialists spend identifying useful materials and information for teachers, planning and delivering instruction with them, and providing in-service training to teachers, the higher the level of academic achievement by students.
- That embraces networked information technology. Where networked computers are more widely available and where library media specialists are more involved in managing school networks, test scores are higher.

After the latest Colorado study indicated a correlation with test scores for individual, but not group, visits to library media centers, it was somewhat surprising that the Oregon study yielded such correlations for both individual and group visits. The group visits correlation is a likely consequence of an intensive campaign in that state to encourage classroom teachers to bring their classes to the LMC for team-teaching involving both the LMS and the teacher.

Common Findings

All of the recent studies of the impact of school library media programs on academic achievement provide evidence to support several common findings:

- Professionally-trained and credentialed school library media specialists do make a difference that affects student performance on achievement tests.
- In order for library media specialists to make this difference, the support of principals and teachers is essential.
- Library media specialists cannot do their jobs effectively unless they have support staff who free them from routine tasks and enable them to participate in a variety of one-to-one and group meetings outside the library media center.
- Library media specialists have a two-fold teaching role. They are teachers of students, facilitating the development of information literacy skills necessary for success in all content areas, and they are in-service trainers of teachers, keeping abreast of the latest information resources and technology.
- Library media specialists also must embrace technology to be effective. They must ensure that school networks extend the availability of information resources beyond the walls of the LMC, throughout the building, and, in the best cases, into students' homes.

Distinguishing Results

Though the four recent studies consistently yielded the foregoing common findings, each study also produced some distinguishing results.

- The Alaska study was the first to identify the importance of library media specialists as teachers of information literacy. It was also the first to demonstrate the impact on achievement of the library media specialist as an in-service trainer of teachers.
- The Pennsylvania study was the first to delineate the specific activities of library media specialists involved in an integrated, collaborative approach to teaching information literacy.
- The second Colorado study was the first to distinguish between the leadership and collaboration activities of library media specialists and to demonstrate the critical pro-active contribution of leadership activities to setting the stage for collaboration and, in turn, higher achievement levels for students.
- The Oregon study demonstrated that group visits to LMCs, particularly those for information literacy instruction, as well as individual visits can be a predictor of test performance. This study was also the only one of the recent group to indicate the value of time library media specialists spend developing collections and of interlibrary loan activities.

Controlling for School & Community Differences

The distinguishing feature of the research model employed in the original Colorado study as well as its recent successors in Alaska, Pennsylvania, Colorado, and Oregon is controlling for school and community differences. Claims by earlier studies to have established cause-and-effect relationships between characteristics of library media programs and academic achievement did not do this. Consequently, their results were called into question readily. For example, when it was found

that higher library media expenditures correlated with higher test scores, it was easy to explain away this relationship by attributing the test scores to higher school expenditures generally. The cause of higher achievement was not spending on the library media program in particular, but rather being a prosperous school that could afford to spend more on everything. To preclude this and similar criticisms and to establish a stronger claim that reported correlations reflect cause-and-effect, these studies encompassed data on schools (i.e., per pupil spending, teacher-pupil ratio, various teacher characteristics) and their communities (i.e., poverty levels, racial/ethnic demography, adult educational attainment). These additional variables address most, if not all, of the stronger arguments that could otherwise be made to discount the consistent findings of this line of research.

In all four states, analyses were conducted to measure the impact on test scores of each library media, school, and community characteristic while controlling for the others. The following table summarizes the percentages of variation in test scores that were explained by library media programs at each grade level in the Pennsylvania, Colorado, and Oregon studies. (Such analyses could not be conducted successfully in Alaska due to data and other circumstantial limitations.)

Table 2. Percent of Test Score Variation Explained by Library Media Variables Alone by School Level and State, 1998/99

School Level	Percent of test score variation explained by library media variables alone		
	Pennsylvania	Colorado	Oregon
Elementary	4%*	8%	4%
Middle	5%*	2%	3%
High	6%*	n/a	5%**

* In Pennsylvania, these percentages represent the average variation explained by library media specialist staffing based on a series of partial correlation analyses.
** At high school level in Oregon, the effects of community variables are included in unexplained variation.

After accounting for the considerable impact on academic achievement of community socio-economic conditions—from one-third to three-quarters depending on the state and the school level—library media predictors almost always outperformed other school characteristics, such as teacher-pupil ratio and per pupil expenditures.

Implications

Recommended Actions by School Officials

The practical implications of these research findings are a clear and straightforward call to action.

- School library media programs should be funded sufficiently to employ both professional and support staff and to have both information resources in a variety of formats and the technology necessary to extend the LM program beyond the walls of the library media center.
- Library media specialists should be recognized and utilized by principals and teachers as professional colleagues in the teaching and learning enterprise. Where such recognition and the collaboration to which it leads do not exist, the LMS must exercise some leadership in changing the environment.
- Technology is an essential part of a successful LM program. Information resources, including licensed databases, should be available throughout the school via networked computers in classrooms, labs, and offices.

Library media specialists who wish to make effective presentations of the findings of these studies may find helpful another recent publication, *Powering Achievement: School Library Media Programs Make a Difference: The Evidence* (Lance and Loertscher, 2001). It provides handouts and presentation slides for presentations of varying length and focusing on different issues.

Other Research Questions

Like all research, these studies raised almost as many questions as they answered. They call for further research, both qualitative and quantitative.

- How can library media specialists be taught the leadership skills they need to succeed? While such training is fairly widely available, there is little extant research identifying best practices in this area.
- How should LM specialists, teachers and students interact to improve academic achievement? While studies such as these establish relationships between test performance and certain types of staff activities—cooperative teaching, for example—these findings do not offer much in the way of practical advice to LM specialists about how they can successfully engage teachers and students.
- How does the availability of and involvement with information technology affect the interactions of LM specialists, teachers and students? These studies indicate that the presence of technology and LM staff involvement with it are important, but they do not explain how electronic access to information facilitates effective relationships between LM specialists and others.

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